REMARKS

This is in response to the Office Action dated June 2, 2005. Pursuant to this amendment, claims 1-18 are pending in the application. Reexamination and reconsideration are respectfully requested.

The Office Action rejects claims 1, 3 and 6 over U.S. Patent No. 5,544,188 to Takiguchi, et al., taken in view of U.S. Patent No. 5,557,700 to Nakamura, et al. The other claims stand rejected over the combination of the Takiguchi patent taken in view of the Nakamura patent and further taken in view of one or more other references. Applicant respectfully submits that the cited references do not teach a semiconductor laser having first and second window regions on the edges of the laser. In addition, the Nakamura patent describes a optical modulator structure that is entirely incompatible with the laser structure of the Takiguchi patent. Consequently, the stated combination of these references would not be made and the present claims would not have been obvious over these patents with or without the other cited patents.

The present application describes a relatively high output power semiconductor laser having window regions with optical characteristics tailored to avoid optical damage to the laser. An embodiment is illustrated in FIG. 1. The multilayer gain region is identified as 104 in FIG. 1 and is arranged so that the planes of the multilayers extend between the end faces 110 and 120 of the laser and out of the page. Window regions 112 and 122 are provided on opposite faces of the laser and are respectively covered with low reflectance and high reflectance films 111, 121. Laser light propagates between the low and high reflectance films 111, 121 and out of the window 112 and the low reflectance film 111.

One aspect of the design that is emphasized in the application is that the front and back windows 110 and 120 have wider bandgaps than the well regions of

the gain layer 104. This avoids damage to the laser end faces. Application page 6, lines 19-34. In addition, the exit window 110 has a wider bandgap than the material in the window 120. As discussed in the application, this difference in bandgap between the two windows 110, 120 unexpectedly results in an increase in the output power of the device. See Application page 8, lines 4-19.

This aspect of the present invention is reflected in pending claim 1, which recites "a second window region formed near the second edge, in which the bandgap of the well layers is ... narrower than the bandgap of the well layers in the first window region." Claim 7, the other independent claim in the application, similarly recites "a second window region formed near the second edge, in which the bandgap of the well layers is ... narrower than the bandgap of the well layers in the first window region." These limitations are nowhere described or suggested in the art of record to this application.

The art cited in the Office Action does not describe or suggest the present invention. In particular, none of the art of record describes a laser that has windows formed along the laser propagation direction. The primary reference in the rejection is the Takiguchi patent, which describes a semiconductor laser but does not describe windows. Referring to FIG. 2 of the Takiguchi patent, a laser is shown in cross section with cladding layers 2 and 4 on top and bottom of a gain region 3. Gain region 3 includes a multilayer structure with well layers 12 and barrier layers 13. Light in this laser propagates within these multilayers of region 3 and propagates outward from the laser parallel to the planes of the multilayers. FIG. 4 shows the bandgaps of the clad layers 2, 4 and the gain region 3 multilayers shown in FIG. 2, with the FIG. 4 structure rotated by 90° so that the clad layer 4 that is on the top of FIG. 2 is shown on the right hand side of FIG. 4. FIG. 4 shows that the bandgaps of the gain region 3 well layers 12 are reduced near the center of

the gain region and increase near the top and bottom of the gain region near the clad layers 4 and 2, respectively.

Because the laser light of the Takiguchi patent's laser propagates parallel to the planes of the multilayers (well 12, barrier 13) of the gain region, the variations in the bandgap of the well layers 12 cannot correspond to the first and second windows defined by the present claims. The Office Action has cited to column 2, lines 36-39 of the Takiguchi patent as describing the windows of the Takiguchi patent's laser. This citation does not support the rejection. The increased bandgap regions are positioned near the clad layers 2, 4, but the light propagation direction of the Takiguchi patent's laser is parallel to the plane of the clad layers. That is, the light of the Takiguchi patent's laser propagates parallel to and not through the layers that the Office Action identifies as a window. Consequently, the Takiguchi patent does not suggest or describe the present invention because the Takiguchi patent provides no teachings with respect to windows formed along the propagation direction of the laser light.

In particular, claim 1 distinguishes over the Takiguchi patent by reciting "first and second edges disposed oppositely in a propagation direction of light emitted from the emission region" and the first and second window regions are respectively formed near the first and second edges. What the Office Action identifies as windows (12a) are not disposed near first and second edges.

The Nakamura patent, which is cited as a secondary reference, does not address this deficiency of the Takiguchi patent. Most strikingly this is true because the Nakamura patent does not relate to a semiconductor laser and what is described in the Nakamura patent would render a semiconductor laser inoperative if it were somehow incorporated into a semiconductor laser. What the Nakamura patent describes is an optically driven modulator for modulating a primary light

signal, which might be a laser beam. The Nakamura patent's optical modulator includes a varying bandgap, varying absorption structure. The uneven bandgap of the waveguide of the Nakamura patent's modulator would not produce gain at a uniform wavelength over any length of a laser cavity and so is inappropriate for a semiconductor laser. In addition, the Nakamura patent's modulator introduces different levels of absorption to its waveguide. These levels of absorption would result in significant power reduction to the laser, if the waveguide were incorporated in a laser and the resulting laser would operate at all. Consequently, it would not have been obvious to modify the teachings of the Takiguchi patent in light of the Nakamura patent.

Claim 1 distinguishes over the art of record by reciting "first and second edges disposed oppositely in a propagation direction of light emitted from the emission region" and reciting the presence of "a second window region formed near the second edge, in which the bandgap of the well layers is ... narrower than the bandgap of the well layers in the first window region." The Takiguchi patent fails to teach or suggest windows along the propagation direction of the laser light and none of the secondary references suggest altering this aspect of the Takiguchi patent. Consequently, independent claim 1 and its dependent claims distinguish over the art of record and are in condition for allowance. Claim 7 and its dependent claims similarly distinguish over the art of record and are in condition for allowance.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los

Angeles, California telephone number (310) 785-4600 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
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